WHAT IS CLAIMED IS:

1. A method of driving a piezoelectric transformer with a primary electrode and a secondary electrode, the piezoelectric transformer stepping up a voltage input at the primary electrode with a step-up ratio which varies depending on a frequency according to a piezoelectric effect, and releasing the stepped up voltage from the secondary electrode, the method comprising:

detecting a linear differential value of the step-up ratio of the piezoelectric transformer with respect to the frequency; and

controlling the driving frequency for the piezoelectric transformer according to the detected linear differential.

2. A method of driving a piezoelectric transformer with a primary electrode, a secondary electrode and a third electrode, the piezoelectric transformer stepping up a voltage input at the primary electrode with a step-up ratio which varies depending on a frequency by a piezoelectric effect, and releasing the stepped up voltage from the secondary electrode and the third electrode, the method comprising:

detecting a linear differential value of a voltage ratio between the voltage input at the primary

electrode and the voltage output from the third electrode to the frequency; and

controlling the driving frequency for the piezoelectric transformer according to the detected linear differential value of the voltage ratio.

3. The method according to claim 2, further comprising:

detecting the voltage output from the third electrode; and

controlling the output voltage of the piezoelectric transformer not to exceed a predetermined voltage level, thereby carrying out the overvoltage protection of the piezoelectric transformer.

4. A method of driving a piezoelectric transformer with a primary electrode, a secondary electrode and a third electrode, the piezoelectric transformer stepping up a voltage input at the primary electrode with a step-up ratio which varies depending on a frequency by a piezoelectric effect, and releasing the stepped up voltage from the secondary electrode and the third electrode, the method comprising:

detecting a phase difference between the voltage input at the primary electrode and the voltage output from the third electrode; and

controlling the driving frequency for the

piezoelectric transformer according to the detected phase difference.

5. The method of driving a piezoelectric transformer according to claim 1, wherein the frequency modifying rate at the sweep of the driving frequency for the piezoelectric transformer is changed according to the linear differential value of the step-up ratio of the piezoelectric transformer with respect to the frequency.

6. The method of driving a piezoelectric transformer according to claim 5, wherein the greater the change rate of the linear differential value of the step-up ratio of the piezoelectric transformer, the smaller the frequency modifying rate at the sweep of the driving frequency for the piezoelectric transformer is.

7. The method of driving a piezoelectric transformer according to claim 4, wherein the smaller the change rate of the phase difference of the piezoelectric transformer, the more the frequency modifying rate at the sweep of the driving frequency for the piezoelectric transformer is.

8. The method of driving a piezoelectric transformer according to claim 1, wherein a range for sweeping the driving frequency for the piezoelectric transformer is determined.

9. The method of driving a piezoelectric transformer according to claim 8, wherein the driving frequency for the

piezoelectric transformer is determined in a range so as not to exceed the resonant frequency of the piezoelectric transformer.

10. A power source apparatus comprising:

a piezoelectric transformer with a primary electrode and a second electrode for stepping up a voltage input at the primary electrode by the piezoelectric effect to output the stepped up voltage from the secondary electrode;

a driving section for driving the piezoelectric transformer at a desired voltage and at a desired frequency;

a current detecting section for measuring a current across a load which is driven by the voltage output from the secondary electrode of the piezoelectric transformer;

a step-up ratio differential detecting section for determining a linear differential value of the step-up ratio of the piezoelectric transformer with respect to the frequency; and

a control section for controlling the driving frequency and the driving voltage for the piezoelectric transformer according to the current across the load detected by the current detecting section and the linear differential value determined by the step-up ratio

differential detecting section.

11. A power source apparatus comprising:

a piezoelectric transformer with a primary electrode, a secondary electrode and a third electrode for stepping up a voltage input at the primary electrode by the piezoelectric effect to output the stepped up voltage from the secondary electrode and the third electrode;

a driving section for driving the piezoelectric transformer at a desired voltage and at a desired level frequency;

a current detecting section for detecting a current across a load which is driven by the voltage output from the secondary electrode of the piezoelectric transformer;

a step-up ratio differential detecting section for determining a linear differential value of a voltage ratio between the driving voltage for the piezoelectric transformer and the voltage output from the third electrode, to the frequency; and

a control section for controlling the driving frequency and the driving voltage for the piezoelectric transformer based on the current detected by the current detecting section and the linear differential value of the step-up ratio determined by the step-up ratio detecting section so that the current across the load is at a

predetermined level.

12. A power source apparatus comprising:

a piezoelectric transformer with a primary electrode, a secondary electrode and a third electrode for stepping up a voltage input at the primary electrode by the piezoelectric effect to output the stepped up voltage from the secondary electrode and the third electrode;

a driving section for driving the piezoelectric transformer at a desired voltage and at a desired frequency;

a current detecting section for detecting a current across a load which is driven by a voltage output from the secondary electrode of the piezoelectric transformer;

a phase difference detecting section for detecting a phase difference between the voltage input to the primary electrode and the voltage output from the third electrode in the piezoelectric transformer; and

a control section for controlling the driving frequency and driving voltage for the piezoelectric transformer based on the current detected by the current detecting section and the phase difference detected by the phase difference detecting section so that the current across the load is at a predetermined level.

13. The power source apparatus according to claim 10,

wherein the control section controls the driving frequency based on the output of the current detecting section so that the driving frequency is varied within a predetermined frequency range, and that the driving voltage for the piezoelectric transformer is varied when the driving frequency reaches the maximum or minimum limit of the predetermined frequency range.

14. The power source apparatus according to claim 10, wherein the control section modifies a frequency modifying rate at the sweep of the driving frequency according to a difference between the driving frequency for the piezoelectric transformer and the resonant frequency of the piezoelectric transformer.

15. The power source apparatus according to claim 14, wherein the control section comprises an A/D converter for converting the detection signal from the current detecting section which is an analog signal into a digital signal, and an arithmetic operating section for processing data represented by the digital signal with the use of a program stored in a memory, and the control section can generate control signals from the arithmetic operation to determine the driving frequency and driving voltage of the piezoelectric transformer.

16. The power source apparatus according to claim 15, wherein the control section is fabricated in the form of an

integrated circuit.

17. The method of driving a piezoelectric transformer according to claim 2, wherein the frequency modifying rate at the sweep of the driving frequency for the piezoelectric transformer is changed according to the linear differential value of the step-up ratio of the piezoelectric transformer with respect to the frequency.

18. The method of driving a piezoelectric transformer according to claim 17, wherein the greater the change rate of the linear differential value of the step-up ratio of the piezoelectric transformer, the smaller the frequency modifying rate at the sweep of the driving frequency for the piezoelectric transformer is.

19. The method of driving a piezoelectric transformer according to claim 2, wherein a range for sweeping the driving frequency for the piezoelectric transformer is determined.

20. The method of driving a piezoelectric transformer according to claim 4, wherein a range for sweeping the driving frequency for the piezoelectric transformer is determined.

21. The method of driving a piezoelectric transformer according to claim 19, wherein the driving frequency for the piezoelectric transformer is determined in a range so as not to exceed the resonant frequency of the

piezoelectric transformer.

22. The method of driving a piezoelectric transformer according to claim 20, wherein the driving frequency for the piezoelectric transformer is determined in a range so as not to exceed the resonant frequency of the piezoelectric transformer.

23. The power source apparatus according to claim 11, wherein the control section controls the driving frequency based on the output of the current detecting section so that the driving frequency is varied within a predetermined frequency range, and that the driving voltage for the piezoelectric transformer is varied when the driving frequency reaches the maximum or minimum limit of the predetermined frequency range.

24. The power source apparatus according to claim 12, wherein the control section controls the driving frequency based on the output of the current detecting section so that the driving frequency is varied within a predetermined frequency range, and that the driving voltage for the piezoelectric transformer is varied when the driving frequency reaches the maximum or minimum limit of the predetermined frequency range.

25. The power source apparatus according to claim 11, wherein the control section modifies a frequency modifying rate at the sweep of the driving frequency according to a

difference between the driving frequency for the piezoelectric transformer and the resonant frequency of the piezoelectric transformer.

26. The power source apparatus according to claim 12, wherein the control section modifies a frequency modifying rate at the sweep of the driving frequency according to a difference between the driving frequency for the piezoelectric transformer and the resonant frequency of the piezoelectric transformer.

27. The power source apparatus according to claim 25, wherein the control section comprises an A/D converter for converting the detection signal from the current detecting section which is an analog signal into a digital signal, and an arithmetic operating section for processing data represented by the digital signal with the use of a program stored in a memory, and the control section can generate control signals from the arithmetic operation to determine the driving frequency and driving voltage of the piezoelectric transformer.

28. The power source apparatus according to claim 26, wherein the control section comprises an A/D converter for converting the detection signal from the current detecting section which is an analog signal into a digital signal, and an arithmetic operating section for processing data represented by the digital signal with the use of a program

stored in a memory, and the control section can generate control signals from the arithmetic operation to determine the driving frequency and driving voltage of the piezoelectric transformer.

29. The power source apparatus according to claim 27, wherein the control section is fabricated in the form of an integrated circuit.

30. The power source apparatus according to claim 28, wherein the control section is fabricated in the form of an integrated circuit.